REMARKS

Status of Claims

Claims 1-15 are pending in this application. Claims 9-15 have been added to further define the present invention. The basis for claim 9 includes the description on page 2, lines 28-29 of the specification. Claims 10-12 are supported by the description on page 3, lines 20-21, 26 and 30-31, respectively. The basis for claim 13 includes the description on page 6, lines 7-8 of the specification. Claims 14 and 15 are supported by the description on page 5, lines 2-5 of the specification.

Rejection of Claims 1-8 under 35 U.S.C. 103(a) over U.S. Patent 4,579,712 to Mori in view of U.S. Patent 5,364,663 to McCune Jr. et al.

Claims 1-8 are rejected by the Examiner under 35 U.S.C. 103(a) over U.S. Patent 4,579,712 to Mori in view of U.S. Patent 5,364,663 to McCune Jr. et al. This rejection is respectfully traversed. Reconsideration and withdrawal thereof are requested.

The Present Invention

The present invention relates to a thermal spray coated piston ring which is provided with a thermal spray coating film containing from 2-40 mass % of Sn, 5-50 mass % of graphite and the balance consisting essentially of Cu.

The Prior Art

The description in col. 1, lines 7-16 of Mori reads as follows:

> To this end, according to one aspect of the invention, there is provided a sliding material having a back metal layer and a graphite-containing phosphor bronze sintered layer bonded to the back metal layer, the graphite-containing phosphor bronze sintered layer consisting essentially of 0.03 to 1 wt % phosphorus, 7.5 to 16 wt % tin, 1 to 8 wt % graphite and the balance copper, and being constituted by phosphor bronze powder passing through a 200-mesh screen and a graphite powder passing through a 350-mesh screen.

Distinctions Between the Present Invention and the Cited Prior Art

The Mori layer contains 7.5 to 16 wt % tin, which the Examiner concludes is within the scope of 2-40 mass % of Sn. The Mori layer contains 1 to 8 wt % graphite, which the Examiner concludes is within the scope of 5-50 mass % of graphite. The Mori layer contains the balance copper, which the Examiner concludes is within the scope of the balance copper of the present invention.

Mori discloses a sintered layer rather than a spray coated layer. The Examiner relies upon the teachings of the McCune reference for teaching thermal spraying. However, the Examiner has not provided the necessary motivation to use the thermal spray coating of McCune for sintering as in Mori. Applicants note that the Examiner states that the motivation for using thermal spraying is to form a more adherent coating. However, Applicants do not agree that such motivation is sufficient to combine the teachings of the references in order to suggest the present invention.

Further, modifying the teachings of Mori in the manner suggested by the Examiner would destroy the teachings of Mori.

More specifically, the Examiner should note that the coating of the Mori reference is not a thermal spray coating. Rather, the coating of the Mori reference is a sintered one having a porous microstructure. The porous microstructure holds or stores oil within it, which is an essential feature (e.g. oil impregnation) of the bush and washer employed for bearings. In this regard, see column 9, lines 59-62 of the Mori reference. Since the raw materials used in the prior art were coarse particles, the binding strength among the powder particles was small and the resulting alloy has poor bending properties and toughness. In order to solve this problem, Mori proposed that fine particles such as phosphor-bronze alloy powder passed through a 200-mesh screen and graphite powder passed through a 350-mesh screen be used to improve mechanical properties such as tensile strength, bonding strength and the hardness of the alloy layer. The use of fine particles increases the contact points of the particles in order to improve the mechanical properties. Porosity of the alloy layer is controlled by the sintering process such as control of the sintering temperature.

In view of the discussion above - and contrary to the position taken by the Examiner- if the thermal spraying of McCune was applied to the invention of Mori, the resulting powder particles of Mori would be melted and sprayed onto a substrate and immediately freeze and form a coating of deformed particles in a lamellar structure. See col. 1, lines 15-20 of the McCune reference. The Examiner should further note that in the thermal spraying process it is difficult to control the porosity of the alloy layer. Also, the microstructure strongly affects the mechanical properties of the sliding materials. Thus, it is readily apparent that the intended microstructure and mechanical properties of Mori could not be obtained by the McCune thermal spraying process.

Clearly, the combination of the teachings of the Mori and McCune references would not result in the present invention. Moreover, modifying the teachings of the references in the manner suggested by the Examiner would destroy the intended purpose or function of the references. Further, there is no motivation for modifying the teachings of the references in the manner suggested by the Examiner in order to obtain the present invention. The Examiner's position to the contrary represents a hindsight reconstruction of the prior art in view of Applicant's own disclosure.

With respect to claims 14 and 15, the Examiner states that Mori teaches that the coating structure may have an upper coating layer of the inventive coating alloy material and a lower coating of copper. However, the lower copper coating of Mori is very thin, that is, an 8μm layer, which is not a film suitable for wear resistance.

Thus, the rejection under 35 U.S.C. 103 should be withdrawn by the Examiner.

Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Marc S. Weiner (Reg. No. 32,181) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

By _____

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